



AN AIRLINE RESERVATION SYSTEM THAT SUPPORTS GUARANTEED  
RESERVATIONS FOR A PREFERRED CATEGORY OF SEATING

FIELD

A system and method for processing airline reservations  
5 for a preferred category of seating and, more particularly, a  
system which optimizes seating arrangements for guaranteed  
reservations to accommodate additional seating requests as  
they are received.

BACKGROUND

10 Airlines are continuously trying to provide passengers  
with enhanced services in order to maintain their current  
passengers as loyal customers and to attract new business.  
For example, frequent flier programs have been implemented,  
additional direct flights have been added and gourmet and  
15 specialty menus have been served. However, limited attention  
has been given to processing reservations for preferred  
seating on an aircraft, which, for many passengers is a  
significant aspect of the flight.

Traditionally, passengers were unable to secure seating  
20 assignments until check-in. However, advances in technology  
have allowed passengers and travel agents to communicate  
directly with an airline's reservation system and procure seat

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unavailable in the seating inventory database and on the seat map. If, however, there is no available seat in the passenger's preferred category of seating, then the passenger is arbitrarily assigned to the next available seat.

- 5 Therefore, earlier-booking passengers have more seating options to choose from as opposed to later-booking passengers.

However, some airlines still do not allow seat assignments to be procured until check-in begins, usually two to three hours before the flight's departure. Additionally,  
10 many passengers choose not to secure seat assignments until check-in, or are unaware of the ability to procure seating prior to check-in. In such situations, passengers securing seat assignments at the earlier part of the check-in process have more seating options available than those passengers  
15 checking in at a later stage of the process. Given the existing seating assignment practices used by current reservation systems, passengers who are later-booking travelers and those who are late arrivals at the check-in counter will have a limited selection when choosing seats for  
20 a given flight.

An airline's ability to accommodate more of its passengers' requests for a particular category of seating is

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seating. In accordance with one aspect of the reservation system, there is provided a method for processing airline reservations for a preferred category of seating, comprising receiving a request for the preferred category of seating, 5 determining if the preferred category of seating is available, and guaranteeing the preferred category of seating.

In accordance with another aspect of the reservation system, there is provided a method for processing airline reservations for a preferred category of seating, comprising 10 receiving a request for multiple preferred categories of seating, determining which of the multiple preferred categories of seating are available, and guaranteeing at least one of the preferred categories of seating.

A request for a preferred category of seating can be 15 received and processed at the time of making the reservation, prior to check-in, or at the check-in counter. In one embodiment, the request is received and processed by the airline reservation controller to determine whether or not the request can be accommodated given the earlier requests that 20 have already been guaranteed a category of seating. An advantage of the reservation system is that the system can reassign passengers to different seats within their guaranteed

category of seating in order to satisfy a subsequent  
passenger's request. Once the passenger is guaranteed a  
category of seating, the passenger is assigned to a "flexible"  
seat assignment. However, the passenger can be reassigned to  
5 a different seat within the same category of seating based on  
another request. Therefore, in the reservation system, the  
passenger is not confirmed for a direct seat assignment, but,  
is guaranteed a category of seating.

The flexible seat assignments are then translated to  
10 permanent seat assignments at a predefined period prior to the  
flight's departure. At this transition point, the passenger  
is permanently assigned to a seat which satisfies his/her  
request for a preferred category of seating, and the passenger  
cannot be reassigned to a new seat.

15 Further features and advantages of an airline reservation  
system that supports guaranteed reservations for a preferred  
category of seating will be obtained by reference to the  
following detailed description and drawings.

While the embodiments of the invention will be described  
20 with reference to an airline reservation system that supports  
guaranteed reservations for a preferred category of seating,  
the method and apparatus described herein are equally

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applicable to other types of reservation systems wherein requests for a preferred category of service are made. For example, the reservation system could be utilized for hotel rooms as well as any venue or event having assigned seats within different categories of seating.

#### BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is a block diagram illustrating an airline reservation system that supports guaranteed reservations for a category of seating;

FIG. 2 is a block diagram illustrating an exemplary embodiment of the airline reservation central controller used in the system of FIG. 1;

FIG. 3 illustrates an exemplary flight inventory database stored in the central controller of FIG. 2;

FIG. 4 illustrates an exemplary reservation database stored in the central controller of FIG. 2;

FIG. 5 is a flowchart illustrating an exemplary process of guaranteeing a passenger's request for a preferred category of seating; and

FIG. 6 is an exemplary timeline illustrating when airline seating is finalized.



It will be understood that the foregoing brief description and the following detailed description are exemplary and explanatory of the reservation system, but are not intended to be restrictive thereof or limiting of the advantages which can be achieved by the reservation system.

### DETAILED DESCRIPTION

#### Introduction

The method and system of the reservation system satisfies the shortcomings of existing reservation systems by guaranteeing the passengers a category of seating and permitting the airline to reassign passengers in order to accommodate additional seating requests. The seating arrangements are then finalized at a predetermined time prior to the flight's departure and the passengers are permanently assigned to a seat within their preferred seating category.

#### System

FIG. 1 illustrates the system for receiving requests for a particular category of seating, evaluating the ability to accommodate seating requests and finalizing seating arrangements at a predetermined time prior to a flight's departure.



received by the passenger, process the passenger's seating request if the passenger did not previously confirm a seating category, and issue a boarding pass.

The boarding pass reader 160 is located at the boarding gate and decodes and evaluates the information magnetically encoded on the boarding pass. The passenger or the boarding agent inserts the boarding pass into the boarding pass reader 160, which is connected to the central controller 100. The boarding pass reader 160 can update the information on the boarding pass by printing the updated information directly on the boarding pass or by issuing a new boarding pass. The boarding pass reader 160 and its function in finalizing seating arrangements will be discussed in further detail below in connection with FIG. 6.

In one embodiment, requests for a selected category of seating can be made directly by a passenger 120, indirectly by a travel agent 110, or by another third party such as a consolidator. The requests are received and processed by the airline reservation central controller 100 to determine if such requests can be accommodated.

Requests for a category of seating can be made at the time the reservation is made or at some point prior to

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category of seating. As subsequent requests are received, the central controller 100 reassigns passengers to different seats that satisfy their seating requests and satisfy the incoming requests. Therefore, once the passenger is guaranteed a  
5 seating category, the passenger is assigned to a "flexible" seat assignment which can be reassigned to accommodate additional requests.

A passenger's request can consist of multiple categories of seating, herein referred to as elements of a request. For  
10 example, a passenger may request a window seat in the first 10 rows of coach class. This request consists of two categories of seating, or two elements: element A is a window seat and element B is a seat in the first 10 rows of coach. In one embodiment, an airline may choose to limit the number of  
15 elements a passenger can specify within a request, or, the airline may choose to accommodate only a portion of the elements within the request.

FIG. 2 is a block diagram illustrating the system architecture of an exemplary airline reservation central  
20 controller 100. As shown in FIG. 2, the central controller 100 is a conventional general purpose computer, including a central processing unit ("CPU") 215, read-only memory ("ROM")

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210 and random access memory ("RAM") 205. The central controller 100 also includes a storage device 230 and a communications port 220. The storage device may include hard disk magnetic or optical storage units, as well as CD-ROM drives or flash memory.

The CPU 215 executes program code stored in one or more of the ROM 210, RAM 205 and/or storage device 230 according to conventional data processing techniques to carry out the functions and acts described in connection with the central controller 100. The CPU 215 preferably comprises at least one high-speed digital data processor adequate to execute program modules for evaluating and optimizing seat assignments. The CPU 215 may be embodied as a single commercially available processor or as a number of processors operating in parallel.

CPU 215 comprises, in one embodiment, a microprocessor such as an Intel® Pentium Processor, which is electronically coupled to each of the central controller's 100 other elements (e.g., RAM, ROM, etc.).

The ROM 210 and/or storage device 230 are operable to store one or more instructions, while the CPU 215 is operable to retrieve, interpret and execute. In one embodiment, the CPU 215 includes a control unit, an arithmetic logic unit

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(ALU) and a CPU local memory storage device. The control unit is able to retrieve instructions from the data storage device 230 or ROM 210 while the ALU is able to perform operations needed to carry out instructions. The CPU local memory storage device is capable of providing high-speed storage used for storing temporary results and control information.

As shown in FIG. 2, the communication port 220 connects the central controller 100 to the check-in controller 150, the boarding pass reader 160, as well as the passengers 120 and travel agents 110. The communication port 220 includes multiple communication channels for simultaneously establishing a plurality of connections.

#### Database Formats

As discussed below in connection with FIGs. 3 and 4, the data storage device 230 includes a flight inventory database 240 and a reservation database 250.

Samples of the contents of databases 240 and 250 are shown in FIGs. 3 and 4. The specific data and fields illustrated in these figures represent only sample records stored in each database. In most cases, the fields shown in FIGs. 3 and 4 are straightforward and self-explanatory. It is to be understood that the data and the fields, as well as the

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number of databases, can be readily modified from the described embodiment and adapted to provide variations for receiving and processing requests for preferred categories of seating. Furthermore, each field may contain more or less information. For example, the address field may be divided into separate fields containing street address, apartment number, city, state, and zip code. Also, in other embodiments, the databases may be combined or divided into additional databases.

FIG. 3 illustrates an exemplary flight inventory database 240 that stores information for a given flight, on a per seat basis. For each seat, identified by the seat number in field 305, the flight inventory database includes three seat descriptors: the class, position, and location of the seat in the aircraft, illustrated in fields 310, 315, and 320, respectively.

FIG. 4 illustrates an exemplary reservation database 250 that stores information for each reservation, including passenger requests for a preferred category of seating. The reservation database maintains a plurality of records, such as records 475 - 499, each associated with a different reservation. For each reservation identified by the

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465, which is the field reserved for permanent seat assignments.

### Seating Request Process

FIG. 5 illustrates the process of receiving and evaluating a request from a passenger for a preferred seating category. In one embodiment, the seating request process is executed after the passenger has been confirmed for a flight and the passenger information has been entered into the reservation database 250. In another embodiment, the seating request process is executed when a passenger inquires about a flight reservation, because that passenger will only accept a flight which can accommodate his/her preferred seating request(s).

As shown in FIG. 5, the central controller 100 receives a request for a preferred category of seating from either a passenger 120 or a travel agent 110 (on behalf of a passenger 120) in step 505. The request for a preferred seating category can be received and processed by the central controller 100 at three instances: (1) when the reservation is being made; (2) subsequent to the reservation but prior to check in; or (3) at the check-in counter. In one embodiment, if the passenger 120 chooses not to exercise his/her option of

requesting a preferred category of seating at the time of  
confirming the reservation, then the passenger 120 is notified  
that he/she may contact the airline reservation central  
controller 100 prior to check-in to request a seating  
5 category.

The passenger's request for a preferred seating category  
is entered into the reservation database 250 during step 505.  
The request may consist of multiple categories of seating  
(that is, elements of a request) and, as previously discussed,  
10 the elements are recorded in separate fields in the  
reservation database 250. For example, a passenger 120 can  
request a window seat in the first 10 rows of coach. This  
request has two categories of seating or two elements: element  
A, a window seat, and element B, a seat in the first 10 rows  
15 of coach. An additional illustrative request is an aisle  
seat, in an exit row, adjacent to another passenger on the  
aircraft. This request has three elements or three categories  
of seating, element A, an aisle seat, element B, a seat in an  
exit row, and element C, a seat adjacent to another passenger  
20 on the aircraft. Also, a passenger 120 can still request a  
direct seat assignment instead of a category of seating.

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As seating requests are received and processed, the passenger 120 is assigned to a seat assignment which satisfies either all or some elements of the request. However, the passenger 120 can be reassigned to another seat which

5 satisfies his/her guaranteed request in order to accommodate another passenger's request, hence the term "flexible" seat assignment. Therefore, the passenger 120 is not confirmed for a direct seat assignment but, is guaranteed a category of seating.

10 Once the passenger's request has been received, the central controller 100 evaluates the request to determine whether or not the passenger's request can be accommodated given the earlier requests that have already been guaranteed (step 510). The central controller 100 reassigns passengers

15 to different seats within their guaranteed category of seating in order to satisfy the incoming passenger's request.

Based upon the passenger's request stored in the reservation database 250 and the descriptors associated with each seat in the flight inventory database 240, the central

20 controller 100 evaluates both databases to identify the availability of seats that satisfy the passenger's request. If no seats are originally available, but flexibility is

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evident, the central controller 100 revises and optimizes the seating assignments by reassigning individuals within their guaranteed seating category in order to satisfy the new request. The central controller 100 queries both the flight inventory database 240 and the reservation database 250 to determine the most optimal seating arrangement to accommodate both the guaranteed reservations and the incoming request. For example, if passenger B requests a window seat in row 15 of coach class, and passenger C, who is confirmed for a window seat only, is currently assigned to one of the window seats in row 15, then passenger C can be reassigned to another window seat in the aircraft in order to accommodate the request from passenger B. Additionally, if passengers D and E request a middle seat and a window seat in the last 5 rows of the aircraft adjacent to each another, and passenger F, who is confirmed for a middle seat only is currently assigned to the only available middle seat with an unoccupied adjacent window seat, then passenger F can be reassigned to another middle seat in the aircraft to accommodate the requests from passengers D and E.

Thereafter, the central controller 100 determines whether or not all elements or seating categories of the request can

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Additionally, the reservation database 250 is updated to reflect the current "flexible" seat assignments for all confirmed reservations which may have been modified to accommodate the incoming request (step 550). If, however, the passenger 120 is not satisfied with the elements of the request that can be accommodated, then the central controller 100 can accept a different request for a preferred category of seating from the passenger in step 530. Similarly, if the central controller 100 cannot accommodate any elements of the passenger's request, the central controller 100 can accept a different request for a preferred category of seating from the passenger 120 in step 530. The central controller 100 then returns to step 510 to evaluate whether or not the passenger's new request can be accommodated and the process continues in the manner described above. In confirming the passenger's request, the central controller 100 guarantees that the passenger will be seated in his/her preferred category of seating. The central controller 100 does not issue a seat assignment at this time, but notifies the passenger that he/she is guaranteed to receive the elements of the request that were requested. For example, if a passenger 120 is confirmed for a window seat in an exit row, then that

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passenger is guaranteed that he/she will be seated in one of the window seats in an exit row.

### Transition Point

In one embodiment, the "flexible" seat assignments are converted to "permanent" seat assignments by the central controller 100 prior to the flight's departure. At this transition point 600, the passenger 120 is permanently assigned to a seat which satisfies his/her request for a preferred category of seating and cannot be reassigned to a new seat. Therefore, the passenger 120 cannot be relocated once the "flexible" seat assignment becomes "permanent". FIG. 6 is an exemplary timeline illustrating the various instances when the transition point 600 occurs. The transition point 600, which occurs at a predetermined time before the flight's departure, can collectively convert all of the flexible seats to permanent seats or it can convert seating on an individual basis.

In one embodiment, the transition point 600 occurs when check-in begins (610). At this point, all of the "flexible" seat assignments are converted to "permanent" seat assignments and reallocation of permanent seats is prohibited. Passengers who have not requested a category of seating prior to check-in

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are assigned to seating according to traditional practices, such as scanning the flight inventory to determine the availability of the passenger's request and assigning the passenger to a direct or permanent seat assignment.

5 In a further embodiment, the "transition" point 600 occurs when boarding begins (615), which is usually 30 to 60 minutes prior to the flight's scheduled departure. Thus, passengers can request a guaranteed category of seating during the check-in process. The check-in controller 150 accesses  
10 the airline reservation central controller 100 to determine whether or not the passenger's request can be accommodated in light of previously confirmed requests. If the passenger's request can be accommodated, the check-in controller 150 guarantees the passenger a particular category of seating and  
15 issues a non-confirmed boarding pass to the passenger. (A "non-confirmed" boarding pass, as the term is used herein, is a boarding pass which does not have a seat number printed on it.) The non-confirmed boarding pass does, however, contain passenger information both magnetically encoded and visibly  
20 readable on the boarding pass. If, however, the central controller 100 accepts a passenger's request for an actual seat assignment during the reservation or the check-in

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central controller 100 searches for the "permanent" seat assignment associated with the boarding pass of the passenger and prints the seat assignment on the boarding pass. The boarding pass reader 160 then notifies the central controller  
5 100 that the passenger has boarded the aircraft.

In yet another embodiment, the transition from "flexible" to "permanent" seat assignment occurs when the passenger passes his/her boarding pass through the boarding pass reader 160 at the point of embarkation (620). In this embodiment,  
10 not every flexible seat assignment is converted in a permanent seat assignment at once. Instead, only the seat assignment of the passenger boarding the aircraft at that moment becomes permanent. The boarding pass reader 160 decodes and evaluates the information on the boarding pass and accesses the airline  
15 reservation central controller 100 to convert the flexible seat assignment to a permanent seat assignment and prints the permanent seat assignment on the boarding pass. As passengers board the aircraft and pass their non-confirmed boarding passes through the boarding pass reader 160, their seats  
20 become permanent and can no longer be reassigned by the central controller 100. However, the check-in controller 150 can still reassign those passengers who have not yet boarded

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the aircraft, in order to accommodate a passenger's request received during the check-in process.

In one embodiment, the transition point can be defined by each airline and can be flight specific, allowing for greater  
5 flexibility and increased customer service.

While the embodiments of the invention have been described with reference to an airline reservation system that supports guaranteed reservations for a preferred category of seating, the method and apparatus described herein are equally  
10 applicable to other types of reservation systems wherein requests for a preferred category of service are made. For example, in one embodiment, the category of service can include assigned seating within different categories of seats or assigned rooms within different categories of rooms. Also,  
15 various services that may support guaranteed reservations for a preferred category of service include hotel rooms, seating in stadiums and arenas, seating in concert halls, and seating in a vehicle of transportation.

It is to be understood that the embodiments and  
20 variations shown and described herein are merely illustrative of the principles of the present invention. Therefore, various adaptations and modifications may be implemented by

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